

JVC

SERVICE MANUAL

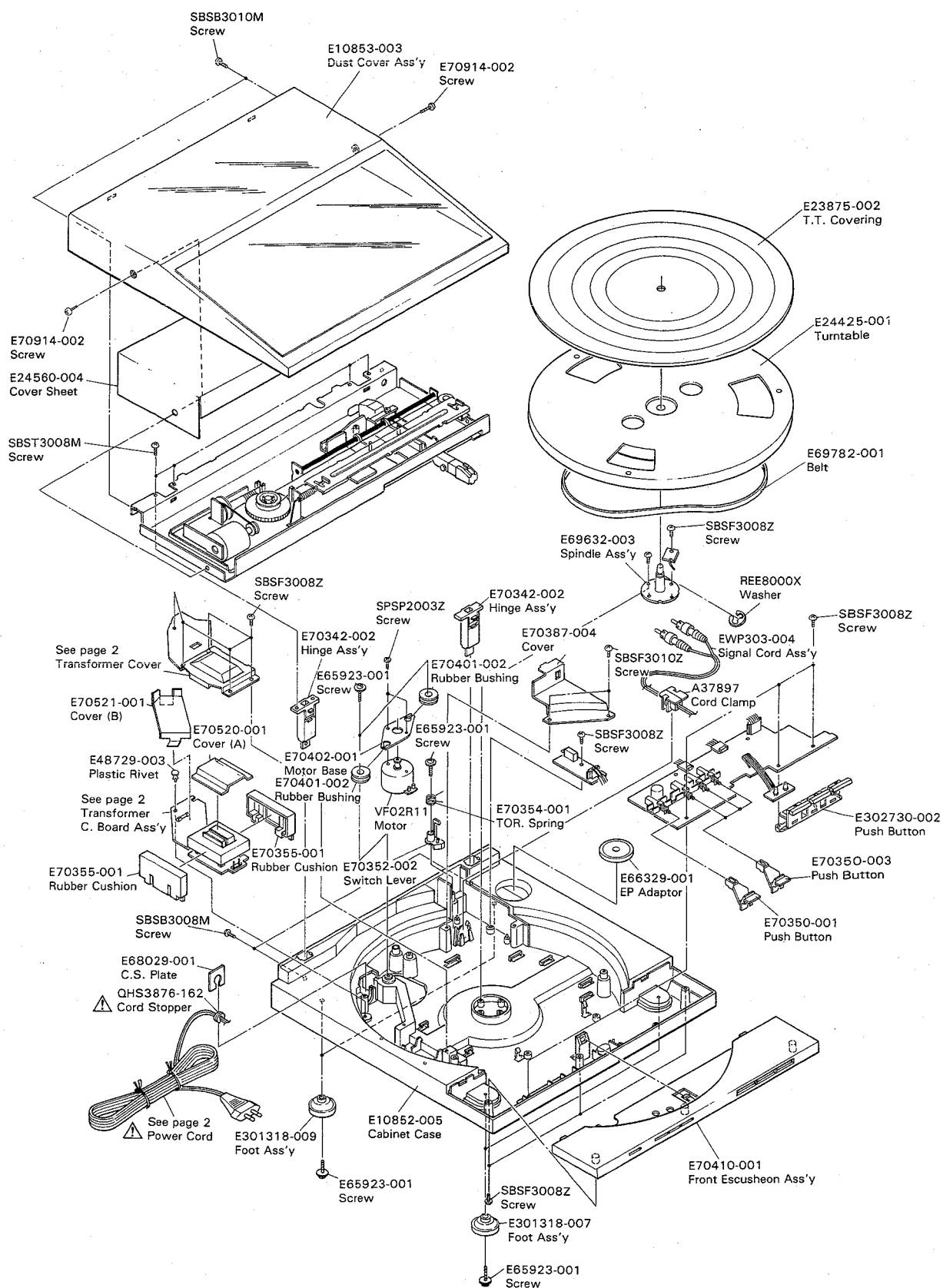
LINEAR TRACKING FULLY-AUTOMATIC TURNTABLE

MODEL **L-E22B**



This model has two types, silver type (Original) and black (New) type on the appearance.
When using this service manual, refer to the L-E22 service manual (No. 2672 Apr. 1983) published previously.

Exploded Views and Part Numbers



 : Safety parts

Specified Numbers on the Appearance for Designated Types

Description	Part Number		Remarks
	Silver (Original)	Black (New)	
Dust Cover Ass'y	E10853-001	E10853-003	
Cabinet Case	E10852-001	E10852-005	
Cover Sheet	—	E24560-004	
Cover	E70387-001	E70387-004	
Tonearm Ass'y	E24430-001	E24563-001	
Packing Case	PK-LE22	PK-LE22B	

Parts List with Specified Numbers for Designated Areas

Item No.	Description	U.S.A.	Australia	Europe & West Germany	U.K.	U.S. Military Market & Other Countries
1	Transformer P.C. Board Ass'y	END-006G	END-006C	END-006D	END-006BBS	END-006E
2	Transformer Cover	E302789-001	E302789-001	E302789-001	E302789-001	E302789-002
3	Power Cord. ⚠	QMP1200-200	QMP2560-244	QMP3900-200	QMP9017-008BS	QMP7600-250

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MODEL
L-E22

**LINEAR TRACKING
FULLY-AUTOMATIC
TURNTABLE**



No. 2672
Apr. 1983

Safety Precaution

1. The design of this product contains special hardware, many circuits and components specially for safety purposes.
For continued protection, no changes should be made to the original design unless authorized in writing by the manufacturer. Replacement parts must be identical to those used in the original circuits. Service should be performed by qualified personnel only.
2. Alterations of the design or circuitry of the product should not be made. Any design alterations or additions will void the manufacturer's warranty and will further relieve the manufacturer of responsibility for personal injury or property damage resulting therefrom.
3. Many electrical and mechanical parts in the product have special safety-related characteristics. These characteristics are often not evident from visual inspection nor can the protection afforded by them necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in the parts list of Service manual. Electrical components having such features are identified by shading on the schematics and by (Δ) on the parts list in Service manual. The use of a substitute replacement which does not have the same safety characteristics as the recommended replacement part shown in the parts list in Service manual may create shock, fire, or other hazards.
4. The leads in the products are routed and dressed with ties, clamps, tubings, barriers and/or the like to be separated from live parts, high temperature parts, moving parts and/or sharp edges for the prevention of electric shock and fire hazard.
When service is required, the original lead routing and dress should be observed, and they should be confirmed to be returned to normal, after re-assembling.

5. Leakage current check

(Safety for electrical shock hazard)

After re-assembling the product, always perform an isolation check on the exposed metal parts of the Products (antenna terminals, knobs, metal cabinet, screw heads, earphone jack, control shafts, etc.) to be sure the product is safe to operate without danger of electrical shock.

Do not use a line isolation transformer during this check.

- Plug the AC line cord directly into the AC outlet. Using a "Leakage Current Tester", measure the leakage current from each exposed metal part of the cabinet, particularly any exposed metal part having a return path to the chassis, to a known good earth ground (water pipe, etc.). Any leakage current must not exceed 0.5 mA AC (r.m.s.).

- Alternate check method.

Plug the AC line cord directly into the AC outlet. Use an AC voltmeter having 1,000 ohms per volt or more sensitivity in the following manner. Connect a 1500 Ω 10 W resistor paralleled by a 0.15 μ F AC-type capacitor between an exposed metal part and a known good earth ground (water pipe, etc.). Measure the AC voltage across the resistor with the AC voltmeter.

Move the resistor connection to each exposed metal part, particularly any exposed metal part having a return path to the chassis, and measure the AC voltage across the resistor. Now, reverse the plug in the AC outlet and repeat each measurement. Any voltage measured must not exceed 0.75 V AC (r.m.s.). This corresponds to 0.5 mA AC (r.m.s.).

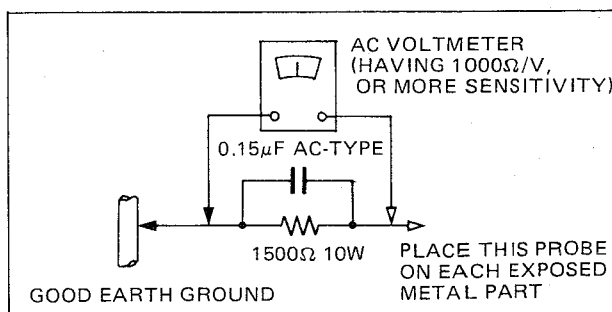
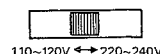


Fig. 1

CHECKING YOUR LINE VOLTAGE (For U.S. Military Market and Other Countries)

Before inserting the power plug, please check this setting to see that it corresponds with the line voltage in your area. If it doesn't, be sure to adjust the voltage selector switch to the proper setting before operating this equipment. The voltage selector switch is located on the cabinet.

CAUTION Before selecting the "Voltage selector switch" to proper voltage disconnect the power plug.



Features

- Linear tracking for zero tracking error
- Plug-in cartridge connector
- Compact size — only 34cm (13-3/8 inches) wide
- Electronically controlled fully automatic operation

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1. Specifications

MOTOR SECTION

Motor	: DC servo-motor
Drive system	: Belt drive
Speeds	: 33-1/3, 45 rpm
Wow and flutter	: 0.06 % (WRMS) 0.08 % (DIN)
Signal-to-noise ratio	: More than 60 dB (DIN-B)

TONEARM SECTION

Type	: Linear tracking statically balanced straight arm
Effective length	: 112 mm
Tracking error	: 0.3°

CARTRIDGE SECTION (EXCEPT FOR U.S.A.)

Model	: MD1045
Type	: Moving magnet (MM)
Frequency response	: 10 - 25,000 Hz
Output	: 2.5 mV (1 kHz 50 mm/s)
Channel separation	: 25 dB/1 kHz (test record: TRS-1)
Load resistance	: 47 kohms
Compliance	: 9×10^{-6} cm/dyne (Dynamic)
Stylus tip	: 0.6 mil conical stylus (diamond)
Stylus	: DT-45
Optimum tracking force	: 1.25 g

GENERAL

Dimensions	: 87(H) x 340(W) x 340(D) mm 3-7/16" (H) x 13-3/8" (W) x 13-3/8" (D) (Since the dimensions show only the design measurements, an allowance is required when installing the unit in a limited space such as a rack, etc.)
Weight	: 3.8 kg (8.4 lbs.) (without corrugated cardboard case)

Accessory
See page 11.

Design and specifications subject to change without notice.

POWER SPECIFICATIONS

Areas	Line Voltage & Frequency	Power Consumption
U.S.A. & CANADA	AC 120 V~, 60 Hz	9 watts
CONTINENTAL EUROPE	AC 220 V~, 50 Hz	9 watts
U.K. & AUSTRALIA	AC 240 V~, 50 Hz	9 watts
OTHER AREAS	AC110~120/220~240 V~ selectable, 50/60 Hz	9 watts

2. Service Precautions

- (1) When replacing parts marked Δ , be sure to use the specified parts to ensure safety.
- (2) When removing the tonearm, motor, mechanism, etc., be sure to check or adjust the lead-in position.
- (3) When servicing the motor for proper speed, be sure to install it level.

3. Names of Controls and Their Functions



Fig. 2

① POWER switch

ON (I) : Press to its "in" position to turn on the power. The AUTO indicator will light.

STAND BY (II) : Press again to set to its "out" position to switch the power off.

Note:

- Even when the POWER switch is set to off, this turntable consumes a small amount of electricity (1 – 2 watts). To shut the power completely off, disconnect the power cord.

② SPEED SELECT button

Select the turntable speed as required.

③ SIZE SELECT button

Used for automatic selection of the position where the tonearm will descend and where playback will end according to the record.

④ REPEAT button

Press this button to replay a record (III). As long as the button is in this position, the record will be repeated continuously. To discontinue replay, press the button again (II).

⑤ MANUAL, AUTO indicator

Indicates manual playback when the MANUAL indicator lights, and automatic playback when the AUTO indicator lights.

⑥ UP/DOWN button

If this button is pressed during playback, the tonearm is raised and the MANUAL indicator will light to show that manual playback is being employed.

When manual playback is used, press this button to lower the tonearm after moving the tonearm using the "►" (START) and "◄" (STOP) buttons.

At the same time that the tonearm is lowered, the AUTO indicator lights to show that automatic playback is being employed, if this button is pressed when the tonearm is raised, the tonearm will be lowered; if it is pressed when the tonearm is lowered, the tonearm will be raised. It can be used to raise the tonearm to pause during the manual or automatic playback of a record.

⑦ START button (◄)

Press this button to start automatic playback.

For manual playback, hold this button pressed. When holding this button pressed, the tonearm will start to move and the indicator will change from AUTO to MANUAL; release this button at the desired position. The tonearm will stop at that position; now press the UP/DOWN button to start playback.

If this button is pressed during playback, the tonearm will move to the left automatically (◄) and return to the rest position; if the UP/DOWN button is pressed while the tonearm is moving, playback will start at that position. This allows it to be used for the playback of any tune (music scanning).

⑧ STOP button (►)

If this button is pressed during playback, the tonearm will move to the right (►) automatically and when it reaches the rest position, the turntable will stop.

If the UP/DOWN button is pressed while the tonearm is moving, playback will start again at that position, so this can be used for music scanning. When the tonearm stops in the up position (manual playback) the tonearm will move to the right (►) while this button is pressed.

⑨ EP adapter

Place the adapter on the center spindle when playing an EP with a large center hole.

4. Main Parts Location

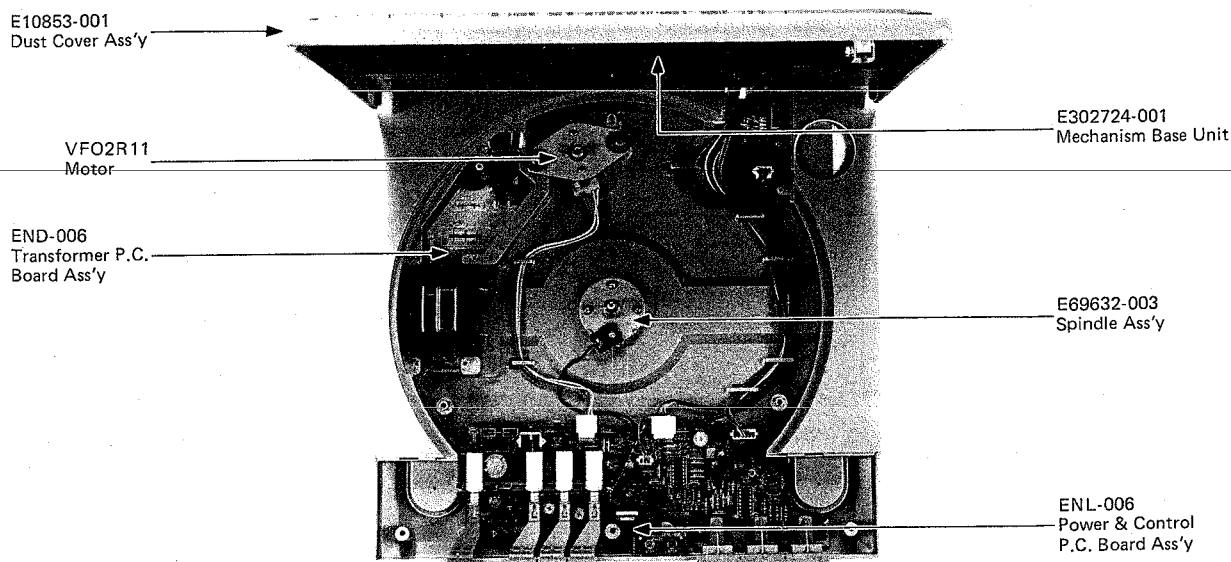


Fig. 3

5. Removal Procedures

5-(1) Replacement of stylus

How to remove the old stylus (Figs. 4 and 5)

Hold the cartridge and press the end of the stylus assembly in the direction of the arrow.

How to fit a new stylus

Being careful not to touch the stylus tip, fit the stylus assembly on the cartridge in the direction of the arrow.

Note: The service life of the stylus depends on conditions of use; the standard is between 800 and 1600 hours.

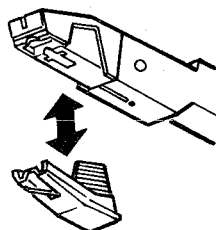


Fig. 4

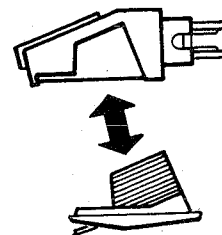


Fig. 5

5-(2) Replacement of cartridge

1. Remove the cartridge fixing screw (Fig. 6).
2. Pull the cartridge forward as shown in Fig. 7.

Note: • A plug-in cartridge is used for the L-E22. Therefore, specify a **T4P** type cartridge when purchasing a new cartridge.

- When replacing the cartridge, be sure to use the provided cartridge fixing screw to obtain the optimum tracking force.

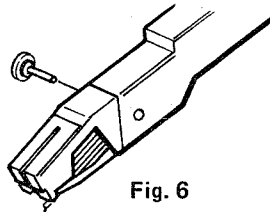


Fig. 6

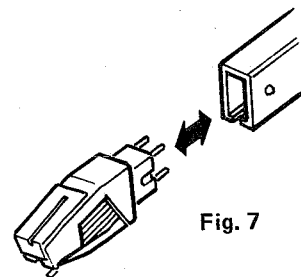


Fig. 7

5-(3) Removal of top cover

1. Remove screws ① and ② where located on both sides of the top cover as shown in Fig. 8.
2. Hold both sides of the top cover and pull it out upward.

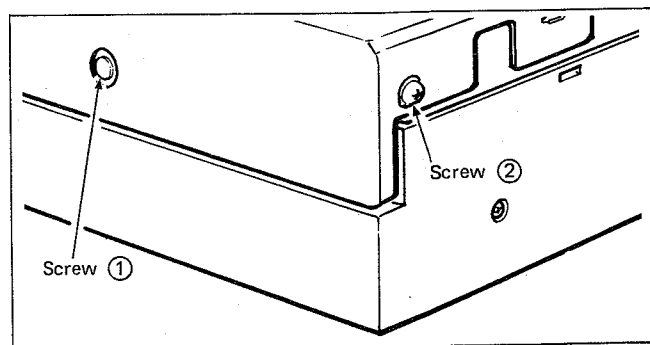


Fig. 8

5-(4) Removal of front escutcheon

1. Remove three screws on the back.
2. Undo the catch of front escutcheon by finger, then remove the front escutcheon in the direction of the arrow as shown in Fig. 9.

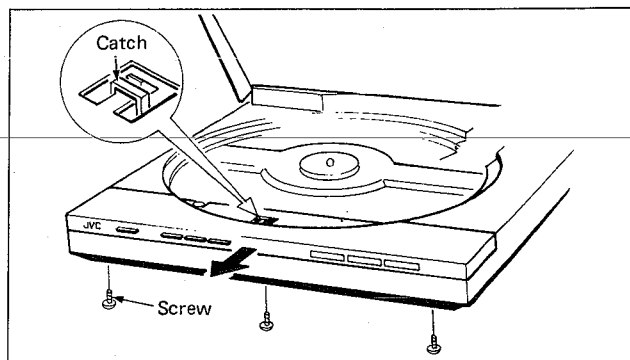


Fig. 9

6. Alignment Procedures

6-(1) Motor RPM adjustment

Turn the adjusting screw with a screwdriver inserted through the hole as shown in Fig. 10.

Turning counterclockwise permits increased RPM, while turning clockwise permits decreased RPM.

RPM	Test record	Band	
33-1/3 rpm (R131)	SS-4141	1, 3 and 5	3150 Hz \pm 0.2 %
45 rpm (R130)	SS-4141	2, 4 and 6	3150 Hz \pm 0.2 %

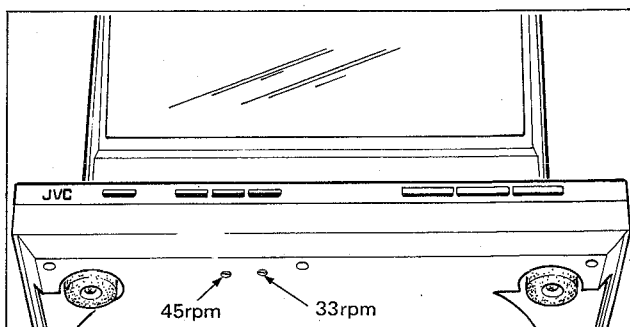


Fig. 10

6-(2) Lead-in adjustment

Adjust it with a screw shown in Fig. 11. Turning clockwise causes the position to shift outwards, while turning counterclockwise causes it to shift inwards.

	Test record	Count	
30 cm lead-in	SS-4343	20 \pm 10	Adjustment
17 cm lead-in	SS-4445	20 \pm 10	Check
30 cm lead-out	SS-4445	16 \pm 4	Check
17 cm lead-out	SS-4445	26 \pm 4	Check

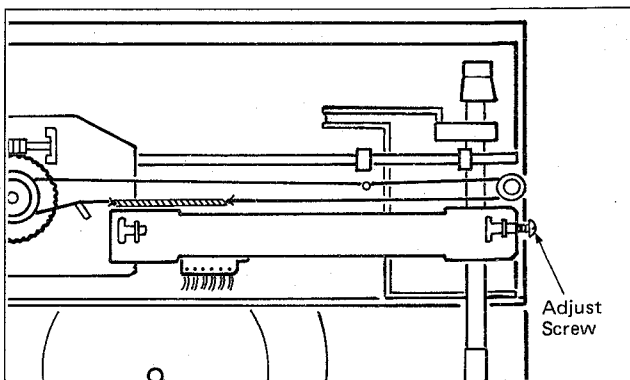


Fig. 11

6-(3) Tonearm following sensitivity adjustment

1. Remove the turntable.
2. With the tonearm at UP position, adjust it with VR(R124) shown in Fig. 12. The output voltage should be $3.7 \pm 0.2V$ between (1) and (2) of test point (TP101).

Note: Adjust the output to this voltage at a lapse of more than 3 minutes after power ON.

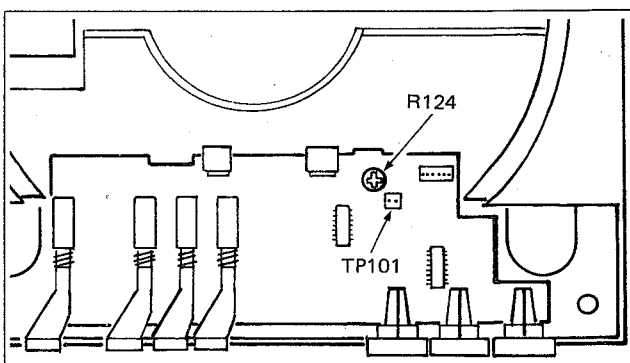


Fig. 12

7. Connection Diagram

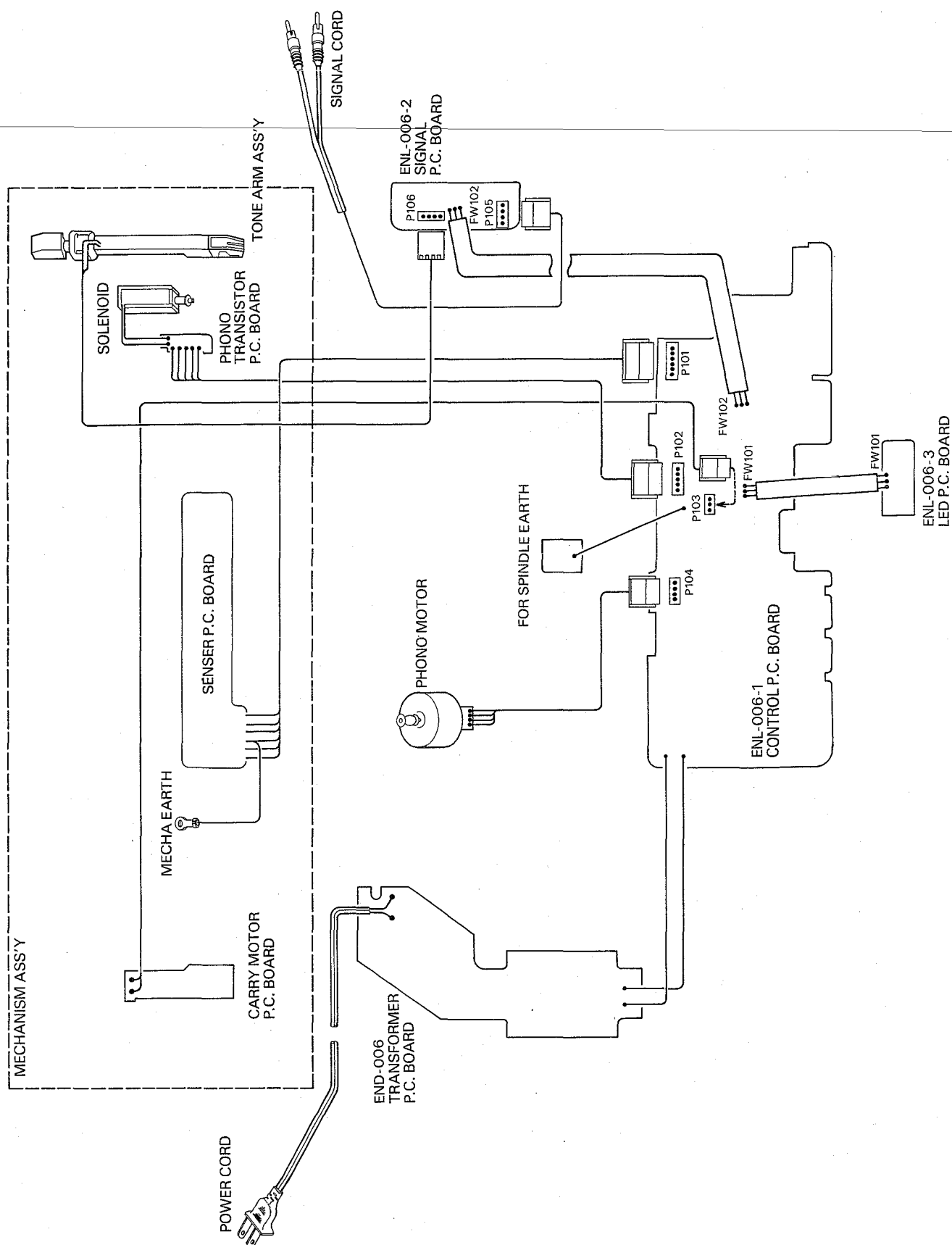


Fig. 13

8-(1) Platter and cabinet



8-(2) Mechanism base ass'y

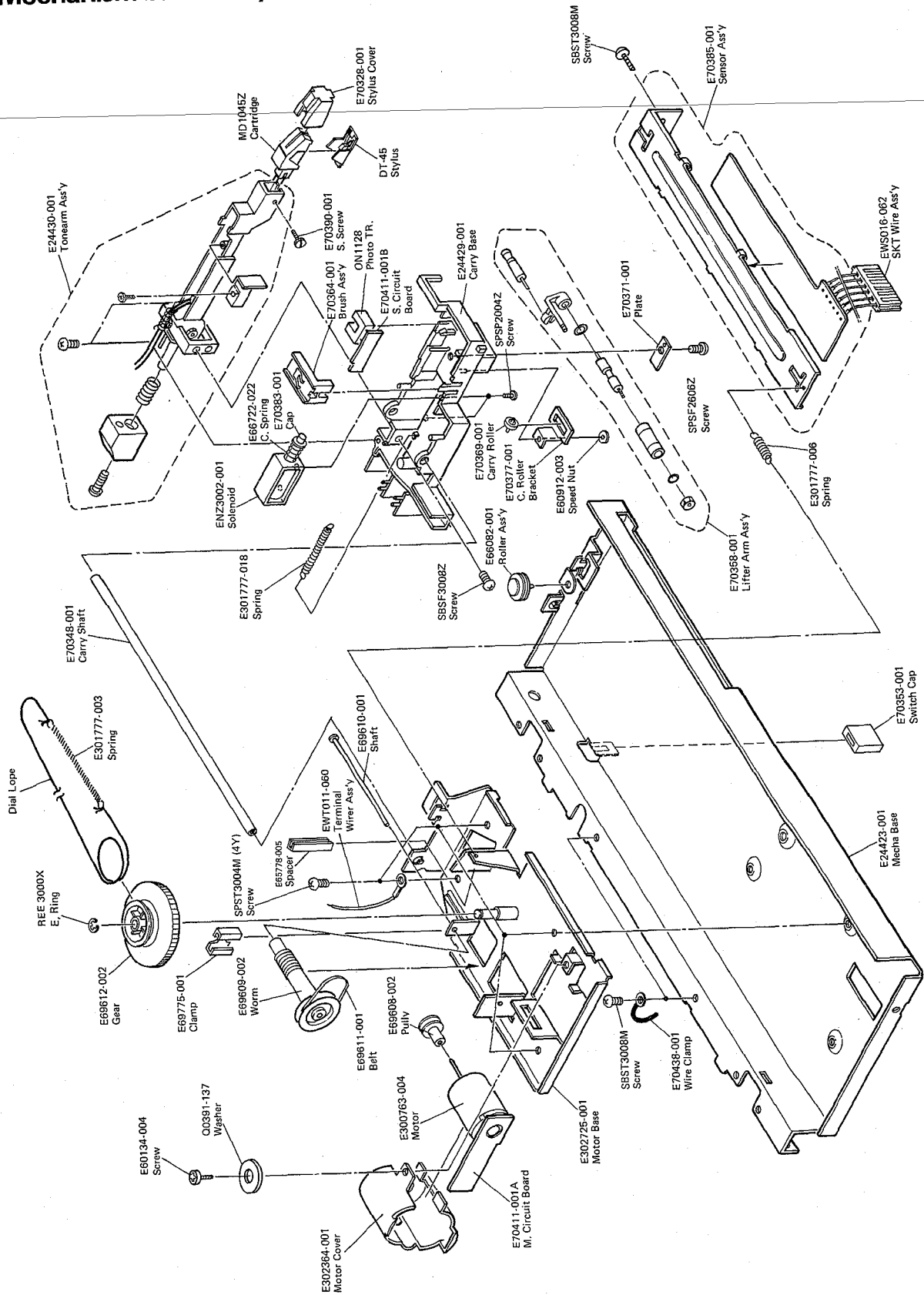


Fig. 15

9. Printed Circuit Board Ass'y and Parts List

9-(1) ENL-006 □ Main amp., power supply & control P.C. board ass'y

Note (1): The number of ENL-006 ☐ varies according to the area employed. See table below.

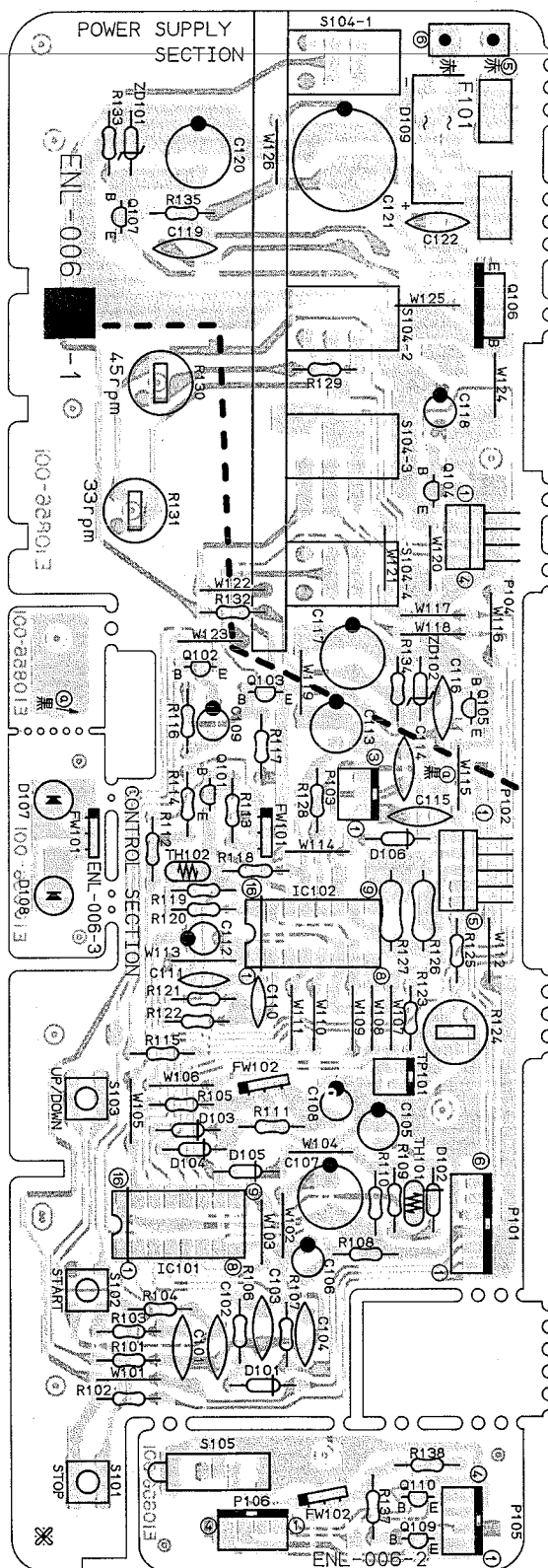
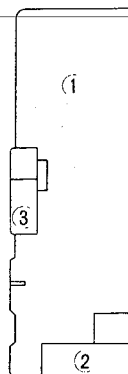


Fig. 16

Each Individual P.C. Board Location



- ① ENL-006-1 :
Main amp., power supply
& control P.C. Board Ass'y
- ② ENL-006-2 :
Signal P.C. Board Ass'y
- ③ ENL-006-3 :
LED P.C. Board Ass'y

Note (1)

Designated Areas	P.C. Board Ass'y
U.S.A. & Canada	ENL-006B
All Other Areas	ENL-006A

Note (2)

The symbols (赤, 黒, 白 ... etc.) on P.C. Board surface are factory process only.

Transistors

Item No.	Part Number	Rating	Description	
				Maker
Q101	2SC1685(Q,R)		Silicon	Matsushita
Q102	2SC1685(Q,R)		"	"
Q103	2SA733A(P,Q)		"	NEC
Q104	2SD467(C)		"	Hitachi
Q105	2SD468(C)		"	"
Q106	2SD1265A(O,P)		"	Matsushita
Q107	2SC1685(Q,R)		"	"
Q109	2SD655(E,F)		"	Hitachi
Q110	2SD655(E,F)		"	"

ICs

Item No.	Part Number	Rating	Description
IC101	M54981P		Maker
IC102	M54547P		Matsushita
			"

Diodes

Item No.	Part Number	Rating	Description	
				Maker
D101	1S2076-31		Silicon	Hitachi
D102	1S2076-31		"	"
D103	1S2076-31		"	"
D104	1S2076-31		"	"
D105	1S2076-31		"	"
D106	1S2076-31		"	"
D107	TLG143		L.E.D.	Toshiba
D108	TLR143		"	"
D109	S1RBA20F1		Silicon	Sindenger
D110	1S2076-31		"	Hitachi
ZD101	RD13EB3		"	NEC
ZD102	RD6.2EB3		"	"

Resistors

Item No.	Part Number	Rating	Description
R101	QRD141J-471S	470Ω ¼W	Carbon
R102	QRD141J-471S	" "	"
R103	QRD141J-472S	4.7kΩ "	"
R104	QRD141J-472S	" "	"
R105	QRD141J-471S	470Ω "	"
R106	QRD141J-472S	4.7kΩ "	"
R107	QRD141J-472S	" "	"
R108	QRD141J-333S	33kΩ "	"
R109	QRD141J-562S	5.6kΩ "	"
R110	QRD141J-102S	1kΩ "	"
R111	QRD141J-332S	3.3kΩ "	"
R112	QRD141J-223S	22kΩ "	"
R113	QRD141J-471S	470Ω "	"
R114	QRD141J-151S	150Ω "	"
R115	QRD141J-223S	22kΩ "	"
R116	QRD141J-223S	" "	"
R117	QRD141J-223S	" "	"
R118	QRD141J-153S	15kΩ "	"
R119	QRD141J-222S	2.2kΩ "	"
R120	QRD141J-121S	120Ω "	"
R121	QRD141J-223S	22kΩ "	"
R122	QRD141J-104S	100kΩ "	"
R123	QRD141J-223S	22kΩ "	"
R124	QVZ3501-223	" "	Variable Carbon
R125	QRD141J-101S	100Ω ¼W	Carbon
R126	QRG012J-101AM	" 1W	O.M. Film
R127	QRG012J-101AM	" "	"
R128	QRZ0061-4R7	4.7Ω ¼W	Fusible
R129	QRD141J-102S	1kΩ "	Carbon
R130	QVP4A0B-222	2.2kΩ 0.1W	Variable
R131	QVP4A0B-222	" "	"
R132	QRD141J-152S	1.5kΩ ¼W	Carbon
R133	QRD141J-102S	1kΩ "	"
R135	QRZ0062-220	22Ω "	Fusible
R136	QRD141J-102S	1kΩ "	"
R137	QRD141J-222S	2.2kΩ "	Carbon
R138	QRD141J-222S	" "	"

Capacitors

Item No.	Part Number	Rating	Description
C101	QCF21HP-223	0.022μF 50V	Ceramic
C102	QCF21HP-223	" "	"
C103	QCF21HP-223	" "	"
C104	QCF21HP-223	" "	"
C105	QET51AM-107	100μF 10V	Electrolytic
C106	QEB51HM-105	1μF 50V	Low Leak Current Electrolytic
C107	QET51CM-107	100μF 16V	Electro
C108	QET51AM-476	47μF 10V	"
C109	QET51HM-105	1μF 50V	"
C110	QCS21HJ-101	100pF "	Ceramic
C111	QCS21HJ-101	" "	"
C112	QET51HM-225	2.2μF "	Electrolytic
C113	QET51CM-107	100μF 16V	"
C114	QCF21HP-223	0.022μF 50V	Ceramic
C115	QCF21HP-223	" "	"
C116	QCF21HP-103	0.01μF "	"
C117	QET51CM-227	220μF 16V	Electrolytic
C118	QET51EM-106	10μF 25V	"
C119	QCF21HP-103	0.01μF 50V	Ceramic
C120	QET51CM-227	220μF 16V	Electrolytic
C121	QET51VM-108	1000μF 35V	"
C122	QCF21HP-223	0.022μF 50V	Ceramic

Others

Item No.	Part Number	Rating	Description
P101	E67764-102		Terminal Ass'y
P102	EMG7331-001		Fuse Clip
	E10856-001		Circuit Board
	QMV5005-006		6P Plug Ass'y
	QMV5004-005		5P Plug Ass'y
P103	QMV5005-003		3P Plug Ass'y
P104	QMV5004-004		4P Plug Ass'y
P105	QMV5005-004		"
P106	QMV5005-004		"
S101	ESP0001-007		Push Switch
S102	ESP0001-007		"
S103	ESP0001-007		"
S104	QST4562-E01		"
S105	QSP0029-001		"
TP101	QMV5005-002		2P Plug Ass'y
TH101	SDT1000		Thermistor
TH102	SDT1000		"

Specified Numbers in END-006 for Designated Areas

Item No.	Description	U.S.A. & Canada	Australia	Europe & West Germany	U.K.	U.S. Military Market & Other Countries
	Fuse Crip	—	EMG7331-001	EMG7331-001	EMG7331-001	EMG7331-001

9-(2) END-006 □ Transformer P.C. board ass'y

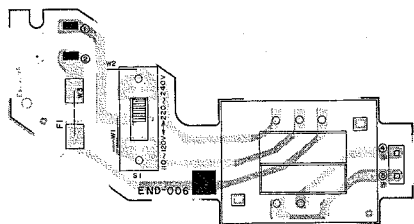


Fig. 17

Designated Areas	P.C. Board Ass'y
U.S.A. & Canada	END-006A
U.K.	END-006BBS
Australia	END-006C
Europe & W. Germany	END-006D
U.S. Military Market & Other Countries	END-006E

Specified Numbers in ENL-006 for Designated Areas

Item No.	Description	U.S.A. & Canada	Australia	Europe & West Germany	U.K.	U.S. Military Market & Other Countries
T001	Power Transformer	ETP1000-18JA	ETP1000-18EA	ETP1000-18EA	ETP1000-18EABS	ETP1000-18LA
F1	Fuse Crip	—	EMG7331-001	EMG7331-001	EMG7331-001	EMG7331-001
S1	Slide Switch	—	—	—	—	QSS2228-103
	Terminal Ass'y	E67764-102	E67764-102	E67764-102	E67764-102	E67764-102
	Circuit Board	E302748-001	E302748-001	E302748-001	E302748-001BS	E302748-001

10. Packing Materials and Parts Numbers

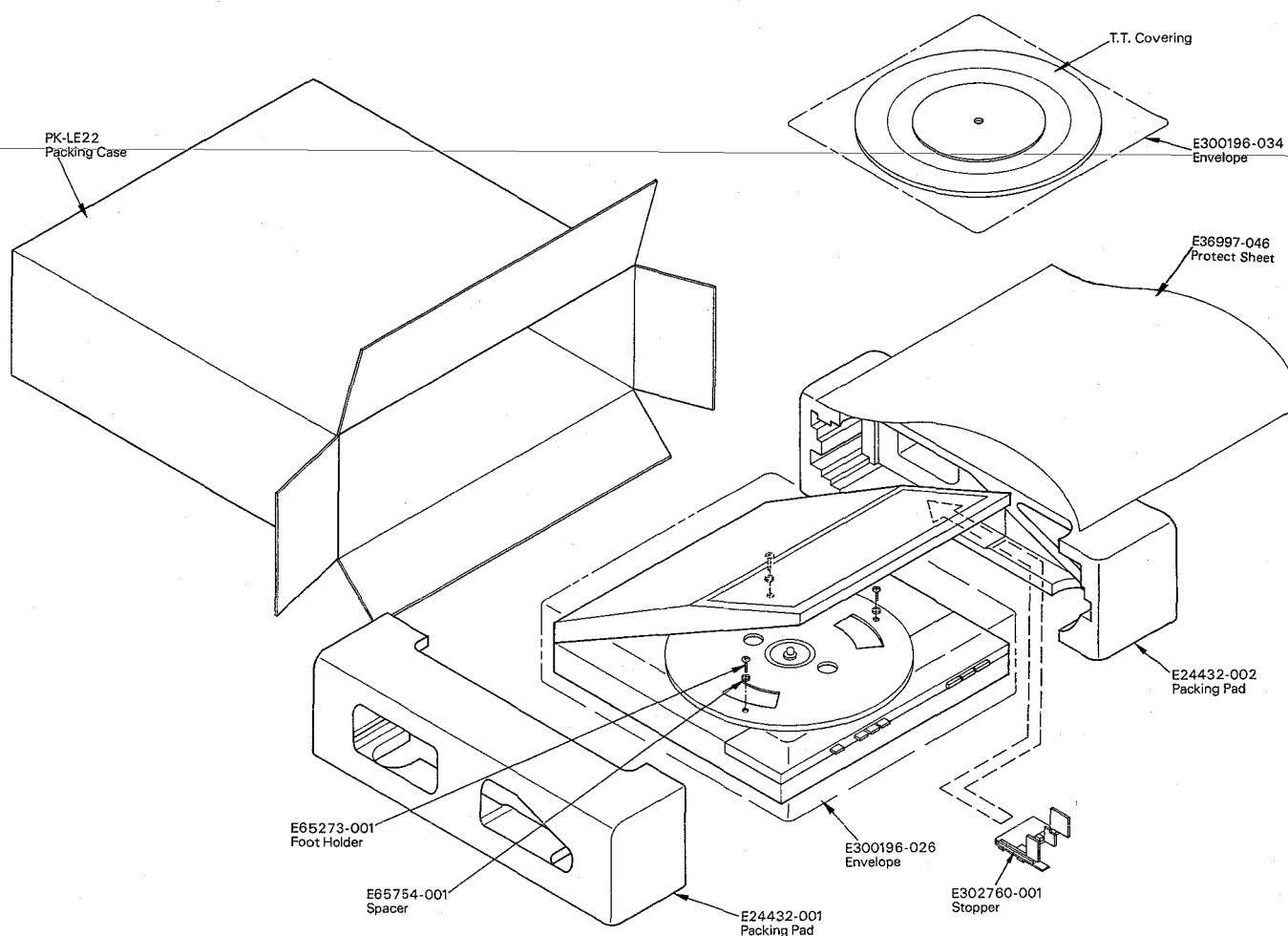
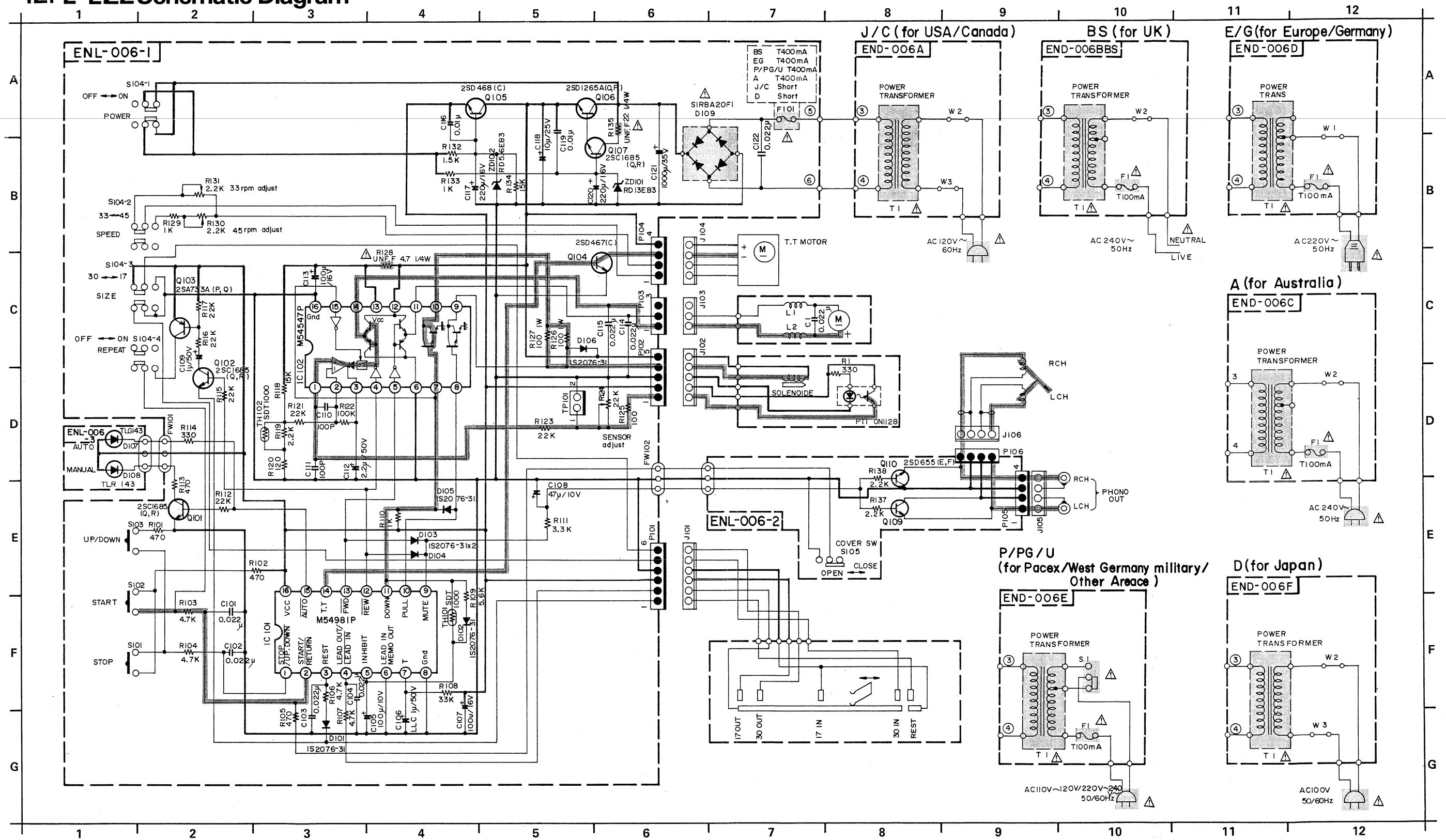


Fig. 18

11. Accessories List

Item No.	Description	U.S.A. & (Canada)	Europe & (Australia)	West Germany	U.K.	U.S. Military Market & (Other Countries)
	Instruction Book	E30580-1134A (")	E30580-1134A (")	E30580-1134A	E30580-1134ABS	E30580-1134A (")
	Warranty Card	BT20047A (BT20025F)	— (BT20029C)	BT20064	BT20060	BT20047A (—)
	Service Information Cord	BT20046B (—)	—	—	—	BT20046B (—)
	EP Adaptor	E66329-002 (")	E66329-002 (")	E66329-002	E66329-002	E66329-002 (")
	Siemens Plug	—	—	—	—	— (E04059)
	Safety Instruction	BT20044D (")	—	—	—	—
	Envelope (for Instruction Book)	E300196-010 (")	E300196-010 (")	E300196-010	E300196-010	E300196-010 (")
	Envelope (for Warranty Card)	E66416-003 (—)	—	—	—	—

12. L-E22 Schematic Diagram



Notes:

1. — indicates positive B power supply.
2. ■ indicates signal path.
3. When replacing the parts in the darkened area (■) and those marked with △, be sure to use the designated parts to ensure safety.
4. This is the standard circuit diagram. The design and contents are subject to change without notice.

Q101, Q102, Q107
Q103
Q104
Q105
Q109, Q110

2SC1685(Q,R)
2SA733A(P,Q)
2SD467(C)
2SD468(C)
2SD655(E,F)

Q106 2SD1265A(Q,P)

D101 ~ D106
ZD101
ZD102

1S2076-31
RD13EB3
RD5.6EB3

PT1 ON112B

D107 TLG114
D108 TLR114
IC101 M54981P
IC102 M54547P

MEASURED POINT MODE	IC101															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
REST POSITION	2.60	2.60	1.24	2.60	0.06	0	0.38	0	4.21	0.03	0.07	4.38	4.60	0.06	0.09	5.15
PLAY MODE	2.61	2.61	2.61	2.61	4.00	0	0.38	0	0.06	0.04	4.52	0.72	0.73	0.73	0.09	5.14
ARM UP MODE	2.61	2.61	2.61	2.61	0.05	0	0.37	0	4.22	0.03	0.06	4.58	4.61	0.73	3.40	5.15

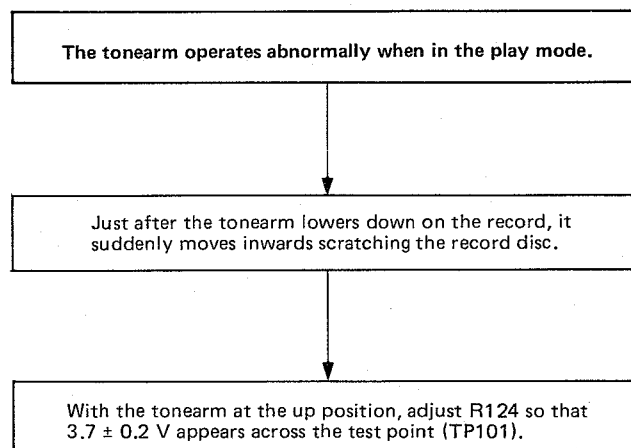
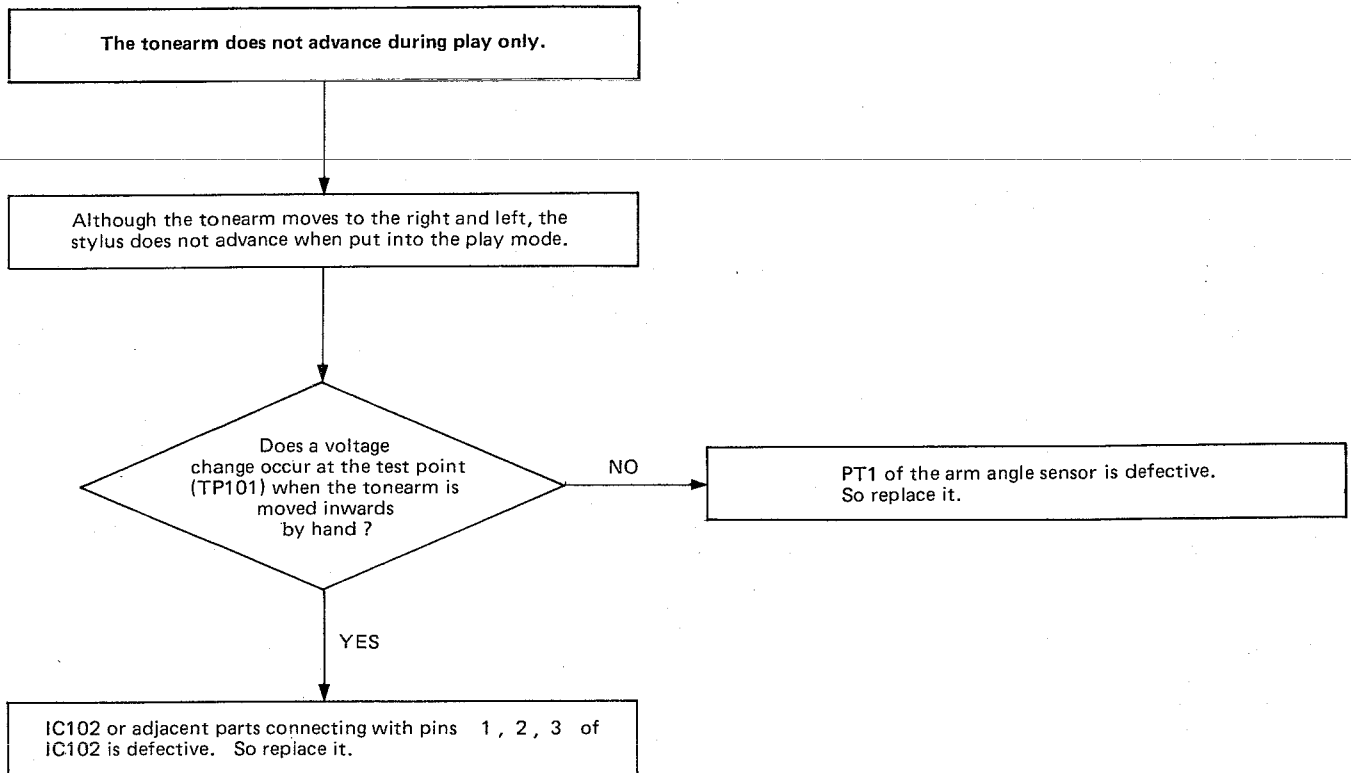
MEASURED POINT MODE	IC102															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
REST POSITION	3.76	3.35	11.7	4.38	4.60	0	0.07	0.03	12.4	12.4	0.37	12.4	12.4	0.37	0.07	0
PLAY MODE	3.84	3.30	11.6	0.72	0.72	0	4.52	0.04	5.87	0.79	11.8	12.2	12.2	11.8	4.52	0
ARM UP MODE	3.78	3.33	11.7	4.58	4.61	0	0.06	0.03	12.4	12.4	0.37	12.4	12.4	0.37	0.06	0

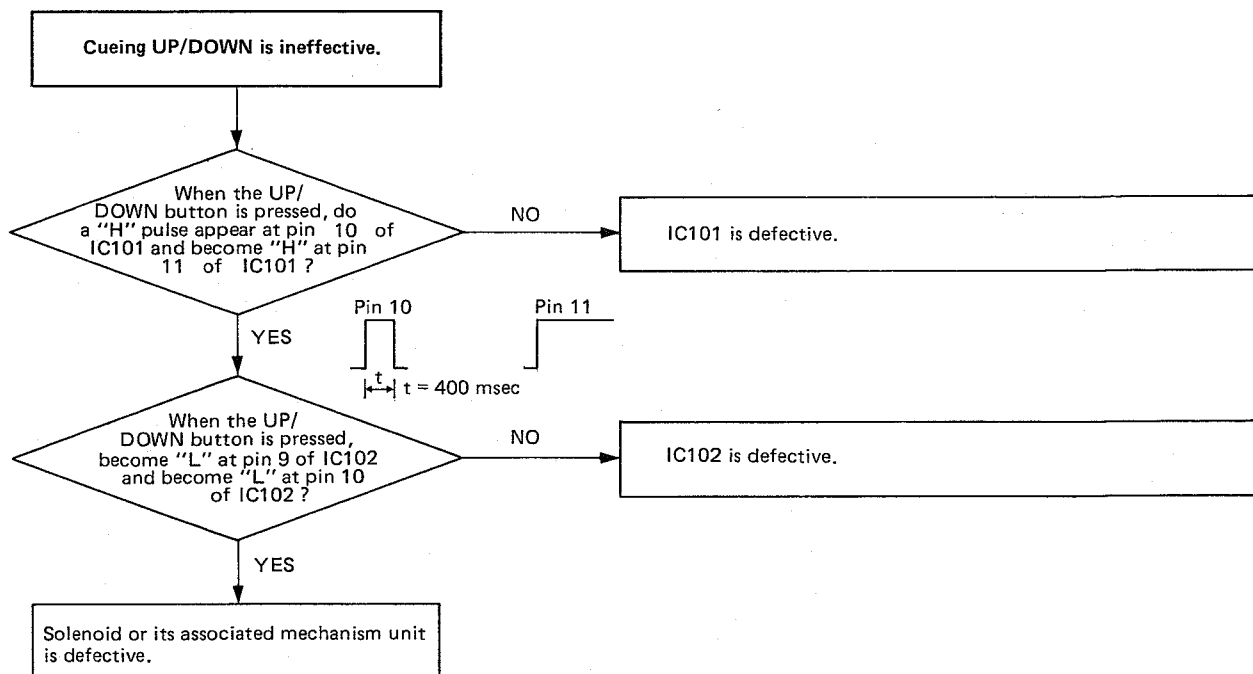
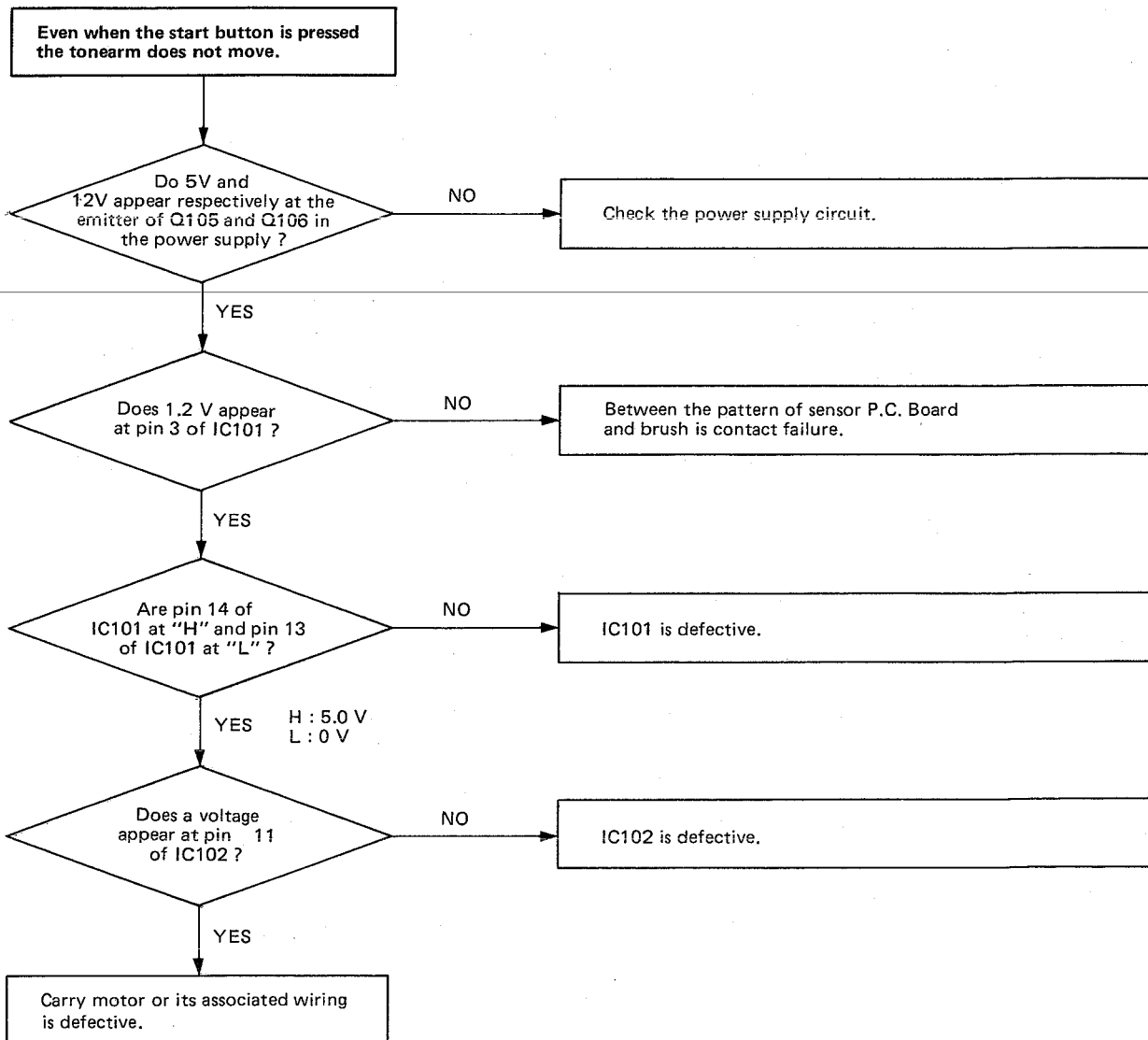
MEASURED POINT MODE	Q101			Q102			Q103			Q104			Q105		
	E	C	B	E	C	B	E	C	B	E	C	B	E	C	B
REST POSITION	0	3.67	0.09	0.02	0.02	0.66	5.16	0	5.14	0	12.2	0.06	5.15	12.4	5.77
PLAY MODE	0	3.66	0.09	2.43	0.38	0.72	5.15	0	5.14	0	0.02	0.73	5.15	12.2	5.77
ARM UP MODE	0	0.08	0.69	4.12	4.12	4.57	5.15	0	5.14	0	0.01	0.72	5.15	12.4	5.77

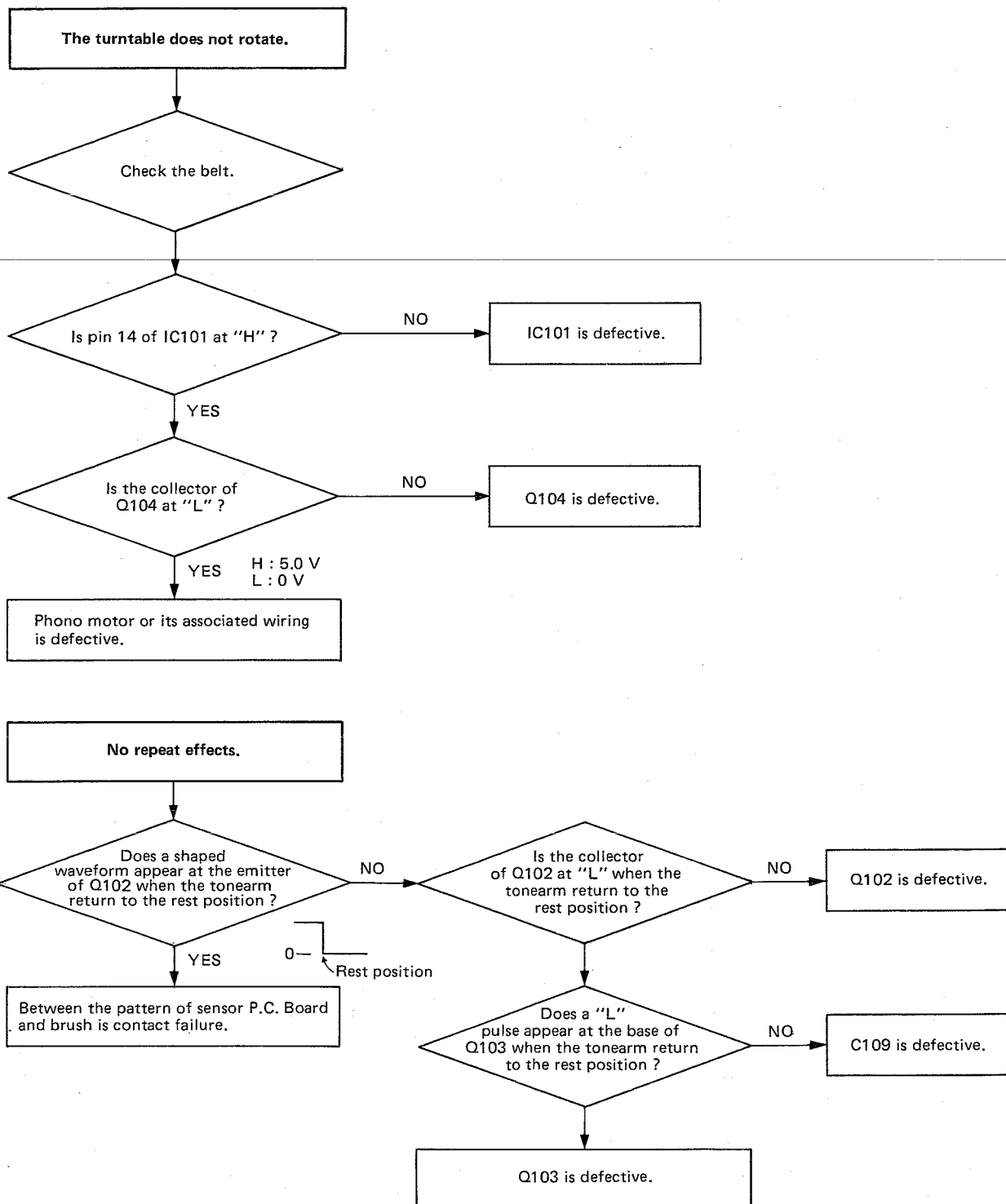
MEASURED POINT MODE	Q106			Q107			Q109			Q110		
	E	C	B	E	C	B	E	C	B	E	C	B
REST POSITION	12.4	20.1	12.9	12.9	20.1	13.5	1.69	1.69	2.09	0	0	0.68
PLAY MODE	12.2	16.9	12.8	12.8	16.9	13.4	0	0	0.06	0	0	0.06
ARM UP MODE	12.4	19.4	12.9	12.9	19.4	13.5	1.65	1.65	2.09	0	0	0.68

- Note
- Unit : Volt
 - Speed : 33 r.p.m.
 - Size : 30 cm
 - Repeat : OFF
 - Voltage Values are measured by a V.T.V.M.


13. Troubleshooting







14. Parts List with Specified Numbers for Designated Areas

Item No.	Description	U.S.A. & (Canada)	Australia	Europe & West Germany	U.K.	U.S. Military Market & Other Countries
1	Transformer P.C. Board Ass'y	END-006A (")	END-006C	END-006D	END-006BBS	END-006E
2	Transformer Cover	E302789-001 (")	E302789-001	E302789-001	E302789-001	E302789-002
3	Power Cord. 	QMP1200-200 (")	QMP2560-244	QMP3900-200	QMP9017-008BS	QMP7600-250
4	Cartridge Ass'y	— (MD1045Z)	MD1045Z	MD1045Z	MD1045Z	MD1045Z
5	Stylus	— (DT-45)	DT-45	DT-45	DT-45	DT-45

 Safety Parts